Volume 3, Issue 2 February 2017 ISSN NO: 2454 - 7514

North Asian International Research Journal Consortium

North Asian International Research Journal

Of

Science, Engineering and Information Technology

NAIRJC JOURNAL PUBLICATION

North Asian International Research Journal Consortium

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ISSN NO: 2454 -7514

North Asian International Research Journal of Science, Engineering & Information Technology is a research journal, published monthly in English, Hindi. All research papers submitted to the journal will be double-blind peer reviewed referred by members of the editorial board. Readers will include investigator in Universities, Research Institutes Government and Industry with research interest in the general subjects

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Address: -North Asian International Research Journal Consortium (NAIRJC) 221 Gangoo, Pulwama, Jammu and Kashmir, India - 192301, Cell: 09086405302, 09906662570, Ph. No: 01933-212815,
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Road Fighter Game Development Using Unity3D

ROHAN BHAGAT[1], ROHIT BHAMORE[2] & POOJA BANGAR[3]

[123]Department of Information Technology Rajiv Gandhi Institute of Technology Juhu-Versova Link Road Versova Andheri (W), Mumbai-53

ABSTRACT-Game designing is a really interactive and creative part of modern IT culture. This has motivated various developers to create interesting games. Thus, we aim to develop an entertaining and fun game based on our childhood favour where we are focusing on developing a 3D racing car game, using a process based upon agile development; an evolutionary development method. Our game is a single player game which provides multiplayer functionality as well. The game will consist of various road maps with power boost challenges and speed timing to get user more addictive and entertain.

Since it is a racing genre game, the multiplayer gaming will focus on races with friends and let the users compete to be the best. Apart from this even time depended mode enables players to track and beat their own high scores. The platform of the game is developed using Unity 3D game engine which is multiplatform software building for games and main coding is in C#. Hence whole game development process will cover implementation of real-time graphics, physics engine, network support, as well as sound effects and background music. Thus we will try to create a game which is extremely entertaining with great graphics to make it visually appealing.

1 INTRODUCTION

Developing software applications is a time-consuming process, and with time-consuming processes come high costs. To address this issue, several software development methodologies, agile software development, have become widely used by software developers. One of the software development methodologies is the evolutionary software method, which allows the project to evolve through different stages of the project and This approach worked on our project where we choose to develop a 3D graphic computer game. Some requirements for the computer game development to 3D environment like 3D graphics, graphical effects, multi- platform. We decided to develop this game in Unity3D platform which gives better working these requirements.

The game is a single player type in racing genre. A racing game is one in which the player generally races other vehicles to secure first position. Unlike the racing genre, we feature only the main player car which has to beat the time set by AI. As a car is vehicle which needs petrol to continue its speed, in our game we will serve power boost on the ways to user alive on the game. The speed and power boost are two main objectives for user while playing with game. The multiplayer type game maximum six player can play same game with their respective environment while races other vehicles to secure first position. For multiplayer game users need to connect each other by LAN cable (Desktop version) and WLAN for android users.

To develop 3D game we have need develop 3D gaming objects, environment and UI, we should use Adobe tools. Adobe tools are also helpful for gaming effects for better graphics. As unity is multiplatform engine, we decided to develop game for desktop (windows platform) and android users. So our final product will be run on windows as well as android devices.

As we are developing 3D game, requirements of high-graphics machine and 3D modelling developments tools are necessary. Unity tool supports of 3D models which develop on Adobe tools are useful. The hard coding throughout the process would be C# as main component of unity tool. As for high graphics performance concern we decided to develop whole activities on 64-bit operating system with 2GB DDR3 graphics (NVIDIA GEFORCE).

1.1 Steps in Game Development

1.1.1 Conceptualization and Initialization

The game development process includes conceptualization of the gaming idea. The game play, the age group, the ratings, game mechanics are all decided in this phase of game development. Various researches are also done to see that the idea is unique and also that it can be implemented.

1.1.2 Game Design Document

A game design document (GDD) is a highly descriptive Living design document of the design for a game. A GDD is created and edited by the development team and it is primarily used in the game industry to organize efforts within a development team.

1.1.3 Technical Requirements

It includes deciding on the platform based on the targeted audience. The tools and the materials required for the game design are also decided in this phase. For our project we would use windows for development of whole process with Unity tool to be installed. Other than Unity we would need software like Adobe tools for creating 3D objects. For android users we would use SDK tool and android device.

1.2

1.1.4 Modelling art and Level Designing

Based on the game concept, the theme and genre are finalized. In our case, the genre is Role playing. Design Game objects and strategically defining levels of game are main aspect by point of user testing mode. This phase should be define to user point of view which will comes more attentions.

1.1.5 3D model & Environment art

Game objects are an integral part of game for developing 3D model. In this phase, the different game objects are designed using the various software. Using adobe tools we should create 3D models of cars and maps.

1.1.6 Developing UI

The user interface, the menu are developed in this phase. The menu is define for users to get in to right direction in game flow. To define UI, we would use C# codes in unity platform. The Game menu will contains different items like play game, controls, sound and single-player or multi-player mode.

1.1.7 Adding Features & Mathematics

Different algorithm and mathematics are used for score calculation; these features and algorithm are added in this phase. The attraction of users are more when there are some features like points, records to get in play game. The physics involved in the game is also added. (Example: collision detection, path finding—A* algorithm etc).

1.1.8 Regression & Integration

After the pre requisites of game are developed. The game development process involves different level of phases while developing one game. This phase includes integrating all the phases to create a responsive and functional game.

1.1.9 Testing & Fixing Bugs:

The developed game is tested on android and windows platform to see if the game features are working well on the device. Also it is checked to see it supports the various devices and android versions Alpha-Beta testing is performed. If any problem is encountered, it is rectified.

Screen Flow of Game Design:

The car road fighter is the racing genre game of cars on road maps. The screen flow is the window for view of users. When user will play game then screen of device is important by user point of view. Thus flow of screen should be in static manner. In our game, first of all it show Menu for user interface when open the game. Menu will contains different options like New Game, sounds, controls, options Player name etc.

As shown in fig. 1.2 , to play game we have to select mode, car and map. Figure show static plan of game how to be process to view by user at a time of playing game.

There are 6 different car model and 5 different maps in game design. User can choose any one car and map at a time and play the Game.

In single-player game, we feature only the main player car which has to beat the time set by AI. The game play on user device only and specific to user need only. Player can select car and map to play the game. So single player strategy is simple to play for user and can play by any type of player like first time playing the game.

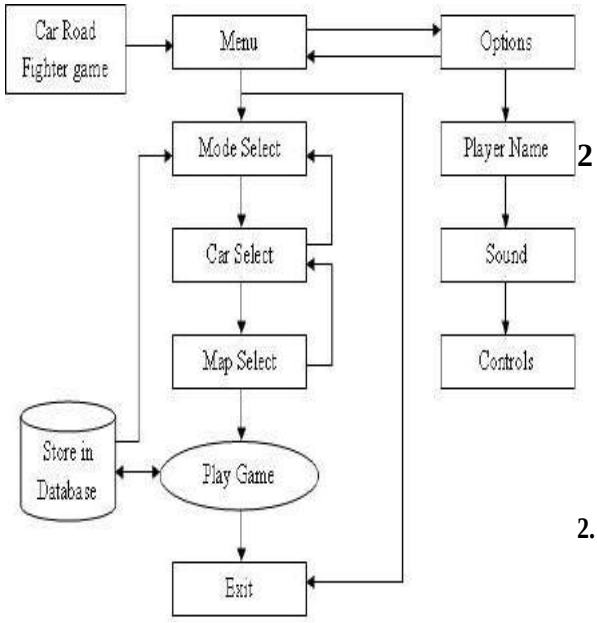

Fig. 1.2: Screen flow of Game

Whereas, In Multi-player, six users can connect through network and play game between them to compute each other to secure first rank in the game. The game can consist of one host device to hosting the game and other will join the game on host server. The hosted device will select the map in this case. As selection of car are user specific for multiplayer mode.

1.3 Features of Game Development

Graphical Effects: The most important for game development is graphical effects that we will be use in the game for high performance and quality.

Sound: The sound effects that can be use are satisfactory like car engine sound, power-up sounds, and coin sounds.

Multi-Platform: The car racing game can be run on android device as well as windows.

Drag and Drop: The implementation of game in unity engine is simple and easy, most of time it is simply drag and drop of objects.

C# Scripting: In game development algorithms we will use c# language which easy to implement with object oriented functionality.

Source Control: Avoid conflicts, easily share, and update your projects while working with unity3D.

User Addicted: Car racing is most popular game from past years. Although we Developing for android platform with multiplayer functionality, craze of gaming should be increase.

2 Unity3D TOOL

As developer tools go, Unity is incredibly successful. A massive 70% of developers in our survey use Unity for some of their projects and 30% use it as their primary development tool. This is not just Hobbyists taking advantage of the free licensing options, Unity is more popular with professionals in general and most popular with the Hunters (53% of them) who are trying to earn their living from the app stores.

2.1 3D and 2D game Engine

Unity supports both 2D & 3D game development, which is quite unusual for a game engine. That said, Unity was really designed for 3D games with 2D support bolted on afterwards; the 2D features were initially just for building menus and other 2D screens needed in a 3D game, to avoid the need for an external tool. The features were quite generic and developers started building games with them; probably due to the broad cross-platform support. To their credit, Unity have supported this and continue to invest in the area.

2.2 Supported languages

Three development languages are officially supported: C#, UnityScript (basically JavaScript with type annotations) and Boo. The last of these, Boo is not widely used and probably best avoided. Given its name, you'd be forgiven for thinking that UnityScript is the main development language, it's not. The Unity community has widely adopted C# and you'll find the majority of plugins and examples use it. If you prefer JavaScript and only have a very simple project in mind then UnityScript is a good option.

Unity Features

Unity has a lot of great features:

Unity has a very strong community of asset and plugin creators – there's lots of free and reasonable priced content available.

Unity's visual editing tools are excellent and the editor can be extended with plugins.

It supports a wide range of asset formats and converts automatically to optimal formats for the target platform.

It supports a very wide range of platforms, mobile, desktop, web and console. Deployment to multiple platforms is very easy to manage.

The 3D engine produces high quality results without any complex configuration (I've personally written a licensed game with Unity that Apple has featured in lots of countries).

There is a free license that covers the majority of features.

Paid licenses are very affordable for most professional developers, available on subscription for $75 per platform currently (some platforms are free).

3 GAMING MECHANICS

Every game that is played today is composed of some very common game mechanics: path finding, collision detection and input. These game mechanics have been around now for decades and have been improved on throughout the years. Here a few very common game mechanics should be use for thesis project.

3.1 Collision Detection

The simplest definition of collision detection in relation to games is to determine if two rectangles in the same 2D or 3D space are overlapping. The determining factors for what method of collision detection to use depending on the game design and precision of the collision data needed. In Unity there is a method already created to help any game enthusiast create a game involving collision detection. The method is called On Collision Enter (Collision).

3.2 Finite State Machine

A finite state machine at the simplest form is a model of how a system or a game will behave. Depending on the input from the player the state of the game can change. Each of the games described in the thesis project use a finite state machine to some extent.

3.3 Timer

The car racing game mainly work with timer to describe user ranking. Timer is main part of our methodology while working. In Unity a timer is constructed by using a local or global variable set to the desired time in seconds. Then just subtract Time.deltaTime from the variable which will decrease it by 1 second.

3.4 Path Finding

The general definition of path finding is plotting a path from a start point to an end point, done by a computer program or algorithm which is applied to a graph. In many cases the shortest path is the subject of interest to find. In the case of video games it is the same except it is done for a character or group of troops and it plots a path around obstacles on a map.

3.5 Dijkstra's Algorithm

It is most used in networking; routers use it to find the shortest path from a computer to a web address the web browser is searching for. It builds a list of hops it needs to take to get to the final address of the web address. This is done because each hop to the next router is given a weight, and so it finds the route with the lowest weight cost and uses that for the route.

3.6 A* Search Algorithm

Using this method allows the algorithm to eliminate longer paths based off this approximation, in turn speeding up the resolution of the shortest path. Using this heuristic approach makes this algorithm faster than the Dijkstra's algorithm.

4 SOFTWARE REQUIREMENTS

4.1 Unity 3D

Unity 3D is a game engine used for developing games for multiplatform use. It is one of the best features of Unity to allow user to create a game able to run on multiple devices or systems. The coding is mostly in C# and the inbuilt assets are easier to access. Unity can handle and support several art assets and file formats from Maya, Blender, Adobe Photoshop and Illustrator. All these assets are handled by Unity's GUI (Graphical User Interface).

4.2 MonoDevelop

The Unity game engine works in conjunction with MonoDevelop for controlling the behaviour of objects. MonoDevelop is an open source Integrated Development Environment or IDE developed by Xamarin and the Mono community which is primarily used for development in the C# programming language. The C# scripts

enable developers to control the logic and behaviours of objects within the Unity environment. In this way, the combined tools of Unity and MonoDevelop enable developers to focus on the development of the AI components of the game rather than on issues related to 3D graphics rendering and physics calculations.

4.3 Adobe Tools

This set of software is used for designing game objects, environment and UI. We will use following two adobe tools for developing 3D art:

4.3.1 Adobe Photoshop

Adobe Photoshop helps the developer create a wide array of objects based on their looks. We can develop the basic environment and art of the game using this. All the game objects will be developed using this tool.

4.3.2 Adobe After Effects

Adobe After Effects is a digital visual effects, motion graphics, and compositing application developed by Adobe Systems and used in the post-production process of filmmaking and television production. Among other things, After Effects can be used for keying, tracking, compositing and animation. The opening and closing credits are designed using this tool.

4.4 Android SDK

Android SDK is necessary to develop an android game. It is connected to Unity 3D. It provides a platform to develop the game. All the assets required for any android game are provided by android SDK. We can host our games on android platform's Google play service.

5 SCOPE OF PROJECT

5.1 Interface to computer world

Computer games are widely used to improve our motivation and re-engagement in Computer Science courses. The process of design and implementation of a playable game, however, is a challenging task and is best accomplished in upper-level courses. Mobile game, on the other hand, are simpler and, thus, easier to program for students in low level courses.

Improves attention stability and enrolment of virtual environment

Game will catch the full attention of the player and immerse them into amazing 3D worlds. These worlds are a perfect place for learning, Game have the ability to actively involve s in learning. Virtual environments are a place where a child can make decisions which may have a terrible outcome. They can see how their decision plays out, if needed go back and refine the decision made to achieve the outcome they were trying for. This teaches that information gained from failing allows for a better chance at future success.

Digital technologies and gaming addiction

In our modern society computers are everywhere, if it is not a computer it is a laptop, tablet or smart phone. It is reported that ninety percent of homes have a computer and of these homes eighty percent have a high speed internet connection. There is no doubt that children are using computers in many ways for instance: for homework, learning, reading, typing and of course playing video games. One major problem associated with computer usage and games is video game addiction. But addiction of car racing games will give some of benefits for users like mind calculations of car speed and their respective controls.

6 CONCLUSION

Development of the game system was made easier because of the implementation tools. The Unity game engine supports effective development of the game system of racer with its high-level abstraction programming tools and intuitive user interface. These features support developers in implementation of AI concepts so that they can focus on the game logic and ignore lower level development details such as graphics rendering and physics calculations. The combined tools of MonoDevelop and Unity support the implementation processes because MonoDevelop consists of auto correction features for many libraries and SDKs used in Unity. In the Unity platform enables the car racing system of the game to be more efficiently Developed. If the Unity platform was not used,

the racetrack would be mapped to a set of coordinates or nodes, which represent the 3D search space that covers the track. Then the path that the race car follows on the racetrack can be determined using either a blind or heuristic search algorithm, which identifies the nodes to be included in the path in the 3D space of the racetrack. The Unity engine has built-in high-level abstractions for trigger detection, which also reduced implementation efforts.

Thus it will easier for us to develop car road fighter using unity which gives effective results as point of view by user. The game environment and effects would be entertaining and statically defined for player.

7 ACKNOWLEDGEMENT

We wish to express our sincere gratitude to Dr. U. V. Bhosle, Principal and Dr. S.B. Wankhade, H.O.D, Department of Information Technology for providing us an opportunity to do our project work on "Car Road Fighter Game Development using Unit3D".

This project bears on imprint of many people. We sincerely thank our project guide Prof. A.E.Patil for his guidance and encouragement in successful completion of our project synopsis.

We would also like to thank our staff members for their help in carrying out this project work.

Finally, we would like to thank our colleagues and friends who helped us in completing the project synopsis successfully.

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